

XIII. "Experiments and Observations on the Structure and Function of the Stomach in the Vertebrate Class." By WILLIAM BRINTON, M.D., Lecturer on Physiology at St. Thomas's Hospital. Communicated by JOHN SIMON, Esq. Received June 12, 1861.

(Abstract.)

This paper, itself a summary of a long series of observations, may be briefly abstracted as follows :—

The peculiar dimorphous structure possessed by the tubes of the cardiac and middle parts of the stomach in the Dog, exists in the whole Vertebrate class ; about sixty species of which are cited by the author from his notes.

Many of the variations of the stomach throughout the Vertebrate class are essentially œsophageal developments, having a mechanical office.

The more essential contrasts of the vertebrate stomach refer to the above dimorphous structure ; which diminishing, even in Man, to less than twice its thickness in passing from the cardia to the pylorus, is in most animals altogether deficient here, either with or without a great shortening of the columnar-celled tubes.

The dimorphous cell-growth is always the source and exponent of the pepsinous or digestive power of the stomach on protein-compounds ; which power is absent where this structure is deficient, and present (as tested by careful comparison) in the degree in which the mucous membrane contains the dimorphous cell-growth.

Of those alternatives respecting the gastric juice suggested by various experiments—namely (1) the secretion of pepsine by the dimorphous cell-growth, and acid by the columnar ; or (2) the perfecting of the secretion (itself perhaps owing these two constituents to its two kinds of cell respectively) in the open ends only of these tubes—the latter is, on the whole, preferable.

The protection of the stomach from its own secretion is effected mainly by the salivary and other secretions which enter it from the œsophagus and duodenum.

The living stomach decomposes a neutral or alkaline blood so as to set free an acid ; but though transfused blood undergoes this de-

composition, a saline solution not only fails to evoke it, but injures or destroys the gastric powers.

There is no evidence of any exhaustion of the pepsinous constituents of the gastric mucous membrane at any period of digestion.

As regards other variations of power, *age* seems to exercise but a moderate influence on the gastric mucous membrane; *species*, again, has a subordinate effect; *genus* is much more influential. For units of mucous membrane, Fishes seem to have the most powerful gastric digestion.

The influences of temperature, analogous in all animals, vary exceedingly as regards the absolute heats which respectively favour, accelerate, and destroy the powers of the stomach; so that the same heat which is practically necessary for the function of this organ in a warm-blooded Mammal, annihilates the efficacy of the pepsine of many Fishes.

The action of the gastric juice is a transfer, to albumen, &c., of a molecular change going on in the gastric juice; pepsine and peptone being essentially analogous to each other in properties.

The formation of peptone is a hydration of albumen, as shown by various collateral circumstances of the process.

ADDENDA.

1. The pancreatic juice, or pancreatic infusion, which converts albumen into a substance akin to peptone, and in proportions not very unlike those which would be obtainable by using certain parts of the mucous membrane of the stomach of some animals, and which does this by a process so far *sui generis*, as that it is no way shared by the salivary organs most analogous to itself in structure and function, is yet distinguishable from the gastric juice in regard to the process and the product of this change. The change is, indeed, an incident of putrefaction only, and therefore not a function of the healthy living organ.

2. The intestinal juice, or the secretion of the intestinal tubes, is neither capable of converting albumen, &c. into peptone, nor of converting starch into sugar. The offices of these tubes are therefore, probably, chiefly of absorption and of excretion.